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LAW OFFICES
HALEY, BADER & POTTS
4350 NORTH FAIRFAX DR., SUITE 900
ARLINGTON, VIRGINIA 22203-1633
TELEPHONE (703) 841-0606
FAX (703) 841-2345

POST OFFICE BOX 19006
WASHINGTON, D.C. 20036-9006
TELEPHONE
(202) 331-0606

SUSAN H. ROSENAU

July 15, 1993

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# SUMMARY

The principal parties objecting to Radian's request to allocate spectrum in the 900 MHz band for Wind Profiler Radar Systems ("Wind Profilers") are the users and manufacturers of Part 15 devices, Location and Monitoring Service ("LMS") systems, and Amateur Radio organizations. They raise theoretical claims that 915 MHz Wind Profilers will cause unacceptable interference with their operations. Virtually all of the analyses are based on flawed and inaccurate data viewed from a steady state perspective which is not

Before The

# Federal Communications Commission

Washington, D.C. 20554

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|---|---|---|
| In The Matter Of | ) | |
| | ) | |
| Amendment of Section 2.106 of | ) | ET Docket No. 93-59 |
| the Commission's Rules to | ) | RM-8092 |
| Allocate Spectrum for | ) | |
| Wind Profiler Radar Systems | ) | |

TO: The Commission

# REPLY COMMENTS OF RADIAN CORPORATION

Radian Corporation ("Radian"), by its attorneys and pursuant to 1.415 of the FCC's Rules, 47 C.F.R. § 1.415, hereby submits its Reply Comments in the above-referenced proceeding. In support of its Reply Comments, Radian states as follows:

## I. BACKGROUND

On April 1, 1993, the Commission issued a Notice of Proposed Rule Making and Notice of Inquiry ("NPRM/NOI") (FCC Document 93-136), seeking comments on a proposal by NTIA to allocate spectrum at 449 MHz for Wind Profiler Radar Systems ("Wind Profilers"), and on Radian's August 12, 1992 Petition for Rulemaking seeking an allocation for Wind Profilers at 915 MHz. Radian and a number of other parties filed comments in support of the 915 MHz allocation, including the National Oceanic and Atmospheric Administration, the United States

Environmental Protection Agency, the South Coast Air Quality Management District, the National Center for Atmospheric Research, and Pennsylvania State University.

Several parties filed comments opposing Radian's proposal or requesting further study of the allocation, including developers and manufacturers of the proposed Location and Monitoring Service ("LMS") systems[1], Amateur Radio organizations, and manufacturers and users of unlicensed Part 15 low power devices.[2] As demonstrated herein, these commenters base their objections primarily on speculation and erroneous assumptions concerning 915 MHz Wind Profilers operations, and place the commenters' business interests above the public interest.

The comments filed by other users of the 915 MHz band have two recurring themes: "We were here first!" and "This will cost us a lot of money!" Although Radian disputes that 915 MHz Wind Profilers will create the interference problems anticipated by the commenters, it is also true that every FCC authorization and the Part 15 rules explicitly state that no Commission license or authorization grants a vested interest in the use of any particular frequency or allocation. *See e.g.,* 47 C.F.R.§ 15.5(a). The mere possibility of interference with another service is,

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[1] The issue of whether the Commission should make permanent allocation of frequency in the 900-928 MHz band is the subject of PR Docket No. 93-61. Radian filed comments therein, and will supply reply comments when they are due.

[2] These commenters included: North American Teletrac and Location Technologies ("Teletrac"); Hughes Aircraft Company ("Hughes"); Pinpoint Communications, Inc. ("Pinpoint"); Southern California Gas Company ("SCGC"); EnScan, Inc. ("EnScan"); Metricom, Inc. ("Metricom"); American Radio Relay League, Inc. ("ARRL"); Consolidated Clients of Wilkinson, Barker, Knauer & Quinn ("Consolidated Clients"); Utilities Telecommunications Council ("UTC"); Mark IV IVHS Division ("Mark IV"); Symbol Technologies, Inc. ("Symbol"); The Telecommunications Industry Association & Mobile & Personal Communications Consumer Radio Section ("TIA"); and Oregon Packet Experimenters Network, Technology Radio Amateur Club, Portland Amateur Radio Club and Oregon Region Relay Council ("Oregon Amateurs").

therefore, not alone sufficient cause to deny an allocation to a new service if the proposed service will benefit the public. Ideally, the Commission will provide for the greatest possible number of services which can successfully share the available spectrum, and when it is not possible to accommodate all of the possible services, it is incumbent on the Commission to determine which allocation or combination of allocations best serves the public interest, even if some existing services must be modified or shifted to other frequencies.[3]

## II. THEORETICAL INTERFERENCE WITH PART 15 USERS DOES NOT JUSTIFY DENIAL OF RADIAN'S PETITION

Several Part 15 commenters argue that the Commission should refuse to allocate spectrum to 915 MHz Wind Profilers based on interference with Part 15 devices, because:

- Part 15 devices are "authorized" to use the 915 MHz band while Wind Profilers are merely a proposed allocation;
- Part 15 users and manufacturers have invested money in equipment and its development; and
- The Commission has formally expressed a desire to "encourage" the development of Part 15 devices.[4]

[3] At the same time, Radian is aware that, once authorized, a new service is under some obligation to mitigate interference to existing users of the band. Radian anticipates that with proper site surveys and user evaluation, such instances will be few. Should they occur, however, Radian recognizes the need for cooperation.

[4] Comments of EnScan, Inc. ("EnScan Comments"), filed June 15, 1993; Comments of the Southern California Gas Company ("Southern Gas Comments"), filed June 15, 1993; Comments of Symbol Technologies, Inc. ("Symbol Comments"), filed June 14, 1993; Comments of the Utilities Telecommunications Council ("Utilities Comments"), filed June 15, 1993; Comments of Metricom, Inc. ("Metricom Comments"), filed June 15, 1993; Comments of the Consolidated Clients of Wilkinson, Barker, Knauer & Quinn ("Consolidated Comments"), filed June 15, 1993.

Further, several commenters argue, allocation of spectrum for Wind Profilers in the vicinity of 915 MHz will create an enforcement problem for the Commission because the Part 15 devices are likely to cause interference to Wind Profilers sharing the band, but will be difficult or impossible to locate and cure. Metricom Comments at 8-9; Comments of the Telecommunications Industry Association ("TIA Comments"), filed June 14, 1993, at 2-3; Southern Gas Comments at 4-5. *See also* Consolidated Comments at 3-4.

In its December 17, 1992 Reply Comments, Radian demonstrated that limited possible interference with Part 15 devices was insufficient as a basis on which to deny Radian's allocation request. Part 15 users are unlicensed, must tolerate interference from licensed operations in the 915 MHz band, and must refrain from causing interference to licensed users of its band. Reply Comments and Amended Petition for Rule Making ("Radian Reply"), filed December 17, 1992, at 2-3.

If credited, the Part 15 Commenters' reasoning would transform Part 15 users from unlicensed, unprotected status into a primary level service which could never be required to share the band with any new or upgraded service. Regardless of the dollars spent on Part 15 systems and FCC statements that Part 15 should be "encouraged," the fact is that the FCC has clearly stated that Part 15 devices have no interference protection. In the same order which allowed low power Part 15 devices to operate in the 900 MHz band, the FCC specifically cautioned prospective users that

> In view of the absence of interference protection for Part 15 devices, it would appear that, wherever possible, operation under the authorized services would be preferable to operation under the Part 15 rules.

*Revision of Part 15*, 4 FCC Rcd. 3493, 3502 (1989).

Thus, from the inception, the FCC has made it clear that Part 15 users requiring interference protection should seek formal authorization pursuant to other rule subparts. Further, the notion that the Part 15 Rules confer some status superior to a new allocation is belied by the Commission's practice of considering and granting allocations which might require Part 15 devices to change frequencies or discontinue operations. *See, e.g., LORAN-C*, 5 FCC Rcd. 7060 (1990); Notice of Proposed Rulemaking, PR Docket No. 93-61 (Document No. FCC 93-141) ("AVM NPRM"), released April 9, 1993, *passim.*

Finally, assuming *arguendo* that Wind Profilers and Part 15 devices could not coexist at 915 MHz -- a point Radian does not concede -- Wind Profilers should be given access to the 915 MHz band in preference to Part 15 devices based on the demonstrated technical need for 915 MHz Wind Profilers. No Part 15 operator has argued that operation of such devices in other bands is not technically possible. In contrast, Radian has demonstrated that high frequency Wind Profilers perform vital services which lower frequency profilers cannot. Radian, NOAA, the Environmental Protection Agency, the South Coast Air Quality Management District, NCARS and representatives of academic institutions have explained the need -- and the demand -- for Wind Profilers at 915 MHz to perform air quality studies in the lower atmosphere at high range resolution, as well as other environmental measurements.

It is also quite possible the Part 15 devices will have to be eliminated from the 900 MHz band to make room for the LMS service, mooting the issue as it relates to 915 MHz Wind Profilers. If these devices are as sensitive as the Part 15 commenters claim, then the relatively high-powered LMS systems surely will force them to other bands, regardless of what the Commission does in this proceeding.[5] Thus, in the absence of a showing that Part 15 devices cannot co-exist with Wind Profilers and LMS systems, *and* cannot move to other bands for technical reasons, Part 15 devices should be required to tolerate interference from Wind Profilers or else shifted to a different frequency to facilitate the requested allocation.[6]

## III. THE LOCATION AND MONITORING SERVICE CAN SHARE THE 915 MHz BAND

Generally, the LMS commenters -- Mark IV, Teletrac, Hughes, Pinpoint and EnScan -- have expressed great concern that Wind Profilers at 915 MHz will interfere with LMS systems, but offer no substantive

[5] The Commission has proposed allocation of 902-928 MHz to LMS systems subject to the interference of Government operations and ISM devices. AVM NPRM at 9. The Commission has also proposed a maximum peak ERP of 300 watts for LMS operations in the 902-928 MHz band. *Id.* at 7.

[6] Metricom, Inc. also has requested that Wind Profilers be granted an allocation -- if at all -- as a fixed service. Metricom Comments, at 9-10. Radian objects to this proposal. Given the mobility and widespread use of Part 15 devices, no purpose would be served by this requirement except again to elevate the status of Part 15 users beyond the

showing that interference is likely.[7] They also show no interest in working with Radian to develop compatible modes of operation.

Radian shortly will be in a position to provide much of the technical information and interference analysis demanded by the LMS and other commenters. Radian is in the process of performing a detailed analysis, which it expects will be completed within the next 90 to 150 days. Radian expects that the results of this analysis will satisfy many of the commenters, including LMS commenters, who have objected that this proceeding is premature and that further technical information is needed,[8] and will better define operating parameters to facilitate the shared use of the 915 MHz band by Wind Profilers, such as distance and frequency separation. Because Radian remains convinced that LMS systems and Wind Profilers can successfully share the band, Radian welcomes cooperation or suggestions from LMS manufacturers or operators interested in jointly testing LMS and Wind Profiler systems to develop fully compatible modes of operation.

**A. Pinpoint Communications, Inc.**

Some of the most specific of the LMS criticisms in this proceeding came from Pinpoint Communications. Pinpoint seeks to operate a wideband pulse-ranging LMS system known as ARRAY™,

[7] These analyses, many of which are erroneously based on an inaccurate steady-state understanding of the proposed system, have been flawed and simplistic. The calculations are wholly inconsistent with results achieved by Radian or, for that matter, by NTIA in its study of the EMC characteristics of Wind Profilers. Radian will make prompt efforts to obtain the NTIA study and submit it to the Commission.

[8] *See, e.g.*, Comments of North America Teletrac and Location Technologies ("Teletrac Comments") at 5-8; Comments of Pinpoint Communications ("Pinpoint Comments"), *passim*; Comments of the American Radio Relay League, Inc. ("ARRL Comments"), filed June 15, 1993, at 13.

which combines a number of LMS functions into a single signal. Pinpoint Comments at 5-6. Pinpoint expressed doubts as to the performance of the side-lobe fences Radian has proposed, and voiced suspicions that side-lobe levels and spillover energy will be substantial. Pinpoint Comments at 8-9. Pinpoint also seeks information about the structure and configuration of the Wind Profiler pulse with respect to time, and its power distribution with respect to frequency. *Id.* at 12. Attached as Exhibit A is a chart depicting correct 915 MHz Wind Profilers characteristics. These technical operating parameters are consistent with the proposed rules associated with Radian's December 17, 1992 Reply Comments, and with the parameters set forth in NOAA's Stage 3 request of May 29, 1992. *See* Radian Reply, Appendix C; Erratum to Reply Comments and Amended Petition for Rulemaking, filed December 18, 1992, Appendix B.

**B. North American Teletrac and Location Technologies, Inc.**

In its Comments, Teletrac argues that: (1) Radian has demonstrated no commercial need for 915 MHz Wind Profilers, (2) Radian has not demonstrated that 915 MHz Wind Profilers will not interfere with AVM systems, and (3) Radian has not offered sufficient technical specifications for Wind Profiler Operations, including duty cycle and the possible use of an emission mask to minimize adjacent channel interference. Teletrac Comments, *passim.* We address these objections in turn.

### 1. Commercial Need

Teletrac's allegation that Radian has failed to demonstrate commercial need for 915 MHz Wind Profilers simply is not correct. Exhibits 2 and 3 to Radian's June 15, 1993 Comments were letters from universities, government and private organizations explaining the need for and value of 915 MHz Wind Profilers. As noted above, a number of entities with a direct interest in 915 MHz Wind Profilers have filed comments in support of the allocation. NOAA and the Environmental Protection Agency, although public entities, have commented in this proceeding to the same effect.[9] While it is highly likely that overall fewer Wind Profiler units will be produced and used than LMS units (which supports Radian's position that peaceful coexistence is feasible), each unit will serve a substantial number of people, whose lives all depend upon the continued quality of the atmosphere, which depends on our ability to monitor the quality of the atmosphere.

### 2. Interference Potential

Teletrac's interference argument begins with a misguided attempt to springboard from the interference argument made by AMTECH Corporation,[10] an LMS commenter whose interference argument Radian showed to be fallacious in its December 17, 1992 Reply

[9] The FCC has noted the operational differences between 400 MHz and 900 MHz Wind Profilers in its recent *Notice of Inquiry* in ET Docket No. 93-198, released June 28, 1993, n. 8, n. 31, in preparation for the next World Administrative Radio Conference (WARC) ("Wind Profilers operating at higher frequencies provide finer resolution at lower altitudes, than those operating at lower frequencies.

[10] AMTECH extrapolated its interference argument from the operational charateristics of 449 MHz Wind Profilers, which, unlike 915 MHz Wind Profilers, operate at much higher power levels and do not utilize side-lobe suppression fences. As a result, Radian entirely discredited AMTECH's analysis. Comments of AMTECH Corporation ("AMTECH Comments"), filed November 2, 1992, pp. 8-9.

Comments. Teletrac argues that AMTECH's system is less sensitive to interference than its own; therefore, if 915 MHz Wind Profilers interfere with AMTECH, they *must* interfere with Teletrac. Teletrac Comments at 5-6. Obviously, Radian's response to AMTECH pertains equally here. *See* Radian Reply at 8-9.[11]

Finally, Teletrac's further assertion that 915 MHz Wind Profilers will be disrupted by rain (Teletrac Comments at 4) is of little significance. This is, in the majority of cases, simply not true. In fact, data collected by a 915 MHz Wind Profiler during a strataform rain or snow storm is actually significantly enhanced. In a very limited number of cases involving convective storms, data may be negatively affected, but typically the opposite is true.

Teletrac and several other LMS commenters further argue that Radian cannot rely on the past record of 915 MHz Wind Profilers for non-interference, because experimental Wind Profiler operations have been limited. Teletrac Comments at 4-7; *see also* Comments of Hughes Aircraft Company ("Hughes Comments"), filed June 15, 1993 at 5-7; Pinpoint

[redacted]

[11] AMTECH's interference analysis made some critical misassumptions which rendered it useless. First, AMTECH assumed that 915 MHz Wind Profilers would

Comments at 11. This argument, too, is incorrect and misleading. With respect to anticipated use after allocation, experimental operations of 915 MHz Wind Profilers have been, relatively speaking, at least as extensive as LMS experimental operations. Wind Profilers at 915 MHz are not going to become a feature of every home and business, like personal computers or cellular phones. These specialized devices have a specialized and limited demand. Accordingly, experimental operations of Wind Profilers at 915 MHz provide a very reliable forecast of future interference problems, i.e., with a proper site survey and evaluation of other users in the area, limited or none.

**3. Technical Specifications**

The technical specification Teletrac will need to perform an analysis of 915 MHz Wind Profiler operations are, in large part, set forth in Exhibit A. See Section III, *supra.*

**4. Summary**

Except as detailed above, none of the LMS commenters have backed up the spectre of interference problems with substantial facts, and none have shown sufficient concern for the public interest to express willingness to work with Radian to resolve any interference problems which may exist. This attitude is a "red flag" that the commenters' main concern is their own self-interest rather than serving the needs of the public, and their objections should be weighted accordingly.

## IV. 915 WIND PROFILERS AND AMATEURS CAN SUCCESSFULLY COEXIST

The final group objecting to allocation of Wind Profilers at 915 MHz are amateur radio users, who are secondary users of the band. The main objection voiced by amateur radio operators to 915 MHz Wind Profilers is that the 900-928 MHz band is already crowded, and soon threatens to crowd amateurs out. *See, e.g.*, Comments of Amateur Radio Relay League, Inc. ("ARRL Comments"), filed June 15, 1993, at 14; Comments of the Oregon Region Relay Council, filed June 15, 1993, *passim*. None of the commenters have supported their objections with evidence that interference is, in fact, likely. In fact, ARRL actually concedes that it does not expect significant interference from 915 MHz Wind Profilers. *See* ARRL Comments at 15-16. It is the *combination* of Wind Profilers and LMS that ARRL fears. *Id.*[12]

Radian maintains its position that, even in the face of the proposed LMS rules, amateurs and Wind Profilers can be good neighbors in the 915 MHz area. No substantive showing has been made to the contrary. Radian is now, as before, willing to work cooperatively with amateurs to achieve that result.

[12] See ARRL [illegible]

## V. CONCLUSION

For these reasons, and those previously set forth by Radian in this proceeding and its original petition, Radian respectfully requests that the Commission move with all diligence to allocate 12.5 MHz in the 908.75 - 921.25 band for the use of Radar Wind Profilers, and adopt the rules set forth in Radian's December 18, 1992 Erratum.

Respectfully submitted,

Radian Corporation

James E. Dunstan

Susan H. Rosenau

HALEY, BADER & POTTS
Suite 900
4350 North Fairfax Drive
Arlington, VA 22203-1633
703/841-0606

July 15, 1993

DECLARATION OF JOHN NEUSCHAEFER .

I am a staff engineer at Radian Corporation, and I am technically qualified to be responsible for the accuracy of Radian's submissions in this proceeding. I have reviewed the foregoing "Reply Comments of Radian Corporation" dated July 15, 1993, and to the best of my knowledge and belief, the statements contained therein are true and correct.

John Neuschaefer

**EXHIBIT A**

## Profiler Characteristics

| | | |
|---|---|---|
| **Center Frequency** | **915 MHz** | |
| **Bandwidth** | | |
| **for 400 nS pulse** | **2.2 MHz (-3 dB)** | **12.5 MHz (-20 dB)** |
| **for 700 nS pulse** | **1.26 MHz (-3 dB)** | **9.6 MHz (-20 dB)** |
| **for 1400 nS pulse** | **0.63 MHz (-3 dB)** | **6.8 MHz (-20 dB)** |
| **for 2800 nS pulse** | **0.32 MHz (-3 dB)** | **4.8 MHz (-20 dB)** |

| | |
|---|---|
| **Peak Power** | **500 W** |
| **Pulse Repetition Frequency** | **0.1 to 50 kHz (subject to duty factor)** |
| **Maximum Duty Factor** | **12%** |

**Phased Array Antenna (normal and large configurations)**

| | |
|---|---|
| **Type** | **Electrically steerable micropatch phased array antenna** |
| **Aperture** | **3.3 or 6.1 $m^2$** |
| **Direction** | **Zenith and ±15.5° from zenith in four orthogonal directions** |
| **Gain** | **~26 or ~28 dBi** |
| **Beamwidth** | **<10 or <7.5 degrees** |
| **Sidelobe levels (horizon to +5°)** | **-45 dB relative to peak** |

CERTIFICATE OF SERVICE

The undersigned, an employee of Haley, Bader & Potts, hereby certifies that the foregoing Reply Comments of Radian Corporation was mailed this date by First Class U.S. Mail, postage prepaid, or was hand-delivered*, to the following:

Mr. Alan R. Thomas
Director, ERL
U.S. Department of Commerce
1335 East West Highway
Silver Spring, MD 20910

Mr. William Gamble
Office of Spectrum Management
U.S. Department of Commerce
National Telecommunications and
Information Administration
Washington, D.C. 20230

Mr. Desmond T. Bailey
Source Receptor Analysis Branch
U.S. Environmental Protection Agency
Office of Air Quality Planning & Standards
Research Triangle Park, NC 27711

Mr. Michael D. Kennedy
Mr. Stuart E. Overby
Motorola, Inc.
1350 Eye Street, N.W.
Suite 400
Washington, D.C. 20005

Mr. Warren M. Powis
Vice President
Cohen, Dippell and Everist
1300 L Street, N.W.
Suite 1100
Washington, D.C. 20005

Christopher D. Imlay, Esq.
Booth, Freret & Imlay
1920 N Street, N.W.
Suite 150
Washington, D.C. 20036

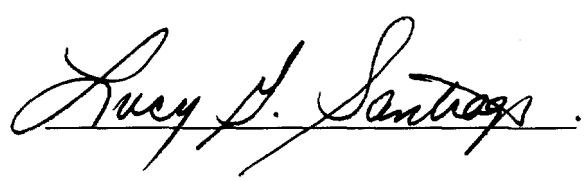
Lawrence J. Movshin, Esq.
Wilkinson, Barker, Knauer & Quinn

[redacted]

George Y. Wheeler, Esq.
Koteen & Naftalin
1150 Connecticut Avenue, NW
Suite 1000
Washington, D.C. 20036

David E. Hilliard, Esq.
Edward A. Yorkgitis, Jr., Esq.
Aliza F. Katz, Esq.
Wiley, Rein & Fielding
1776 K Street, N.W.
Washington, D.C. 20006

Stanley M. Gorinson, Esq.
Keller & Heckman
John B. Richards
1001 G Street, N.W.
Suite 500 West
Washington, D.C. 20001



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